

W5YI

Nation's Oldest Ham Radio Newsletter

REPORT

Up to the minute news from the world of amateur radio, personal computing and emerging electronics. While no guarantee is made, information is from sources we believe to be reliable. May be reproduced providing credit is given to The W5YI Report.

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Resumed FCC Radio Technician Licensing Proposed

Creating a "Heightened Sensitivity" to FCC Rules

Technicians responsible for installing and servicing stations in the Private Land Mobile Radio Services (PLMRS, including dispatch, local government, safety and business radio operations) used to be required to hold a FCC commercial radio license. The FCC dropped the licensing requirement ten years ago, but a new petition for rule making proposes to bring the requirement back.

Dropping the requirement agitated the PLMRS industry. PLMRS licensees and vendors filed more than 200 comments on the FCC proposal to eliminate the requirement. The FCC conceded that almost all comments "vigorously opposed" the idea, but went ahead with it anyway. (The requirement that the radios and/or users be licensed was not changed.)

Trade associations filled the gap with private technician examination and certification programs. Today many radio techs proudly possess such non-FCC certifications. However, the Industrial Telecommunications Association (ITA) believes that unlicensed radio operation has flourished in an environment where many radio users apparently do not have licensed technicians to remind them that FCC licenses are necessary. (The ITA performs frequency coordination and FCC license preparation for industrial radio users.)

"Industry experts estimate that, in some states, unlicensed systems may account for as

much as 30 percent of the total number of systems in operation on the private land mobile frequency bands below 800 MHz," ITA said in its petition for rule making. "Users are able to purchase radios capable of operating in the private radio bands from department store chains or order them from catalogs and mail order warehouses.

"Unless individuals responsible for installing and servicing the radios inform the buyers of the licensing requirement, many buyers are not aware that it is illegal to operate transmitters without first obtaining authority from the Commission."

The FCC eliminated mandatory technician licensing for three reasons. First, the Commission is always looking for ways to save money and to suspend programs that it deems unnecessary. Second, without licenses, the FCC would not have to keep updating the license exams to reflect developments in the field. Third, the FCC believed that industry-based certification programs would be adequate.

ITA believes the FCC can now afford to resume mandatory technician licensing because the FCC is going to obtain more money through regulatory fees and spectrum auctions. (Although amateurs are exempt from these so-called "regulatory fees", most other radio services have seen their costs rise because of this new category of

fees, which they must pay in addition to application fees. The proposed "vanity" call sign program might be considered an optional "regulatory fee" for amateurs.)

Although industry certification programs are useful, ITA said, "there is no meaningful threat of FCC sanctions in situations where service personnel may encourage illegal radio activity. Individuals who promote illegal operations, assuming they went through the effort of obtaining certification in the first place, have no reason for concern that their certification might be revoked."

This is why the association believes that some kind of incentive is needed that would encourage radio technicians to comply with FCC regulations and to encourage their customers to do so. "If the FCC makes licensing mandatory for all individuals who install or service transmitters operating on private land mobile radio frequencies, these individuals will have a license to protect," ITA said.

"In most cases, this will create a heightened sensitivity to FCC operating requirements. Even if the Commission never actually revokes or suspends a technician's license, the mere possibility of revocation or suspension provides a strong incentive for maintenance and service personnel to apprise their customers of the FCC's licensing requirement."

ITA proposes to require that technicians obtain both the industry-granted certification and the FCC license. Like the "GMDSS Radio Maintainer's License" required of maritime techs responsible for Global Maritime Distress and Safety System equipment, the new license would be called the "PLMRS Radio Maintainer's License." It would be valid for life.

At presstime, the FCC had not yet assigned the petition a rulemaking (RM) number for public comment.

This petition is not the first that looks toward restoring an FCC license that certifies technical proficiency. Jim Wills, N5HCT, of Tyler, Texas requested last fall that the FCC revive the old First Class Radiotelephone Operator license which was abolished a decade ago.

In 1984, the Commission discontinued both the 1st and 2nd Class Radiotelephone Operator licenses and replaced them with a lifetime term General Radiotelephone Operator License (GROL.) This action was opposed by most holders of the "First Phone" ticket. They felt their harder-to-obtain license was being downgraded to that of a permanent 2nd Class license.

The FCC accepted that petition last December as having merit and assigned it RM-8400. A 30-day preliminary comment period was then assigned which closed on January 5, 1994. We checked on the status of this proceeding last week and was told that it is still being worked on by the Private Radio Bureau staff.

ARRL KEEPS PUSHING ON 902

The American Radio Relay League has decried what it calls the FCC's proposed "usurpation" of the 902-928 MHz band. This is sometimes called the "Kitchen Sink" band because it supports a wide variety of government, commercial and amateur operations and low-power unlicensed products. Amateur Radio is secondary to the licensed and government services in the band. (Actually, the Amateur Service is secondary on every ham band above 2-meters.)

Among the many services in 902-928 are so-called Automatic Vehicle Monitoring (AVM) services that measure signals from vehicle transmitters to locate the vehicle precisely or to record data from vehicle ID tags. PacTel Teletrac, a partially-deployed AVM operator, petitioned the FCC to update the rules for this service, but the request has amateurs and unlicensed-device makers fuming. The updated service would be termed "Location and Monitoring Service" (LMS). Both interests fear greater interference if LMS systems increase band congestion under new rules.

"Perhaps due to the fact that AVM systems have not occupied the 902-903 and 912-918 MHz segments of the 902-928 MHz band, amateurs have been able to share the band with AVM stations operating under the interim rules since 1985, when amateurs were first given access to the band," ARRL said in reply comments in the AVM docket ET 93-61.

ARRL continued: "Amateur use of the band has been growing since then. It has become an important segment for amateur weak-signal experimentation (at 902-903) MHz and for amateur television (at 912-918 MHz) due to saturation of the lower UHF and VHF amateur allocations, and because of regulatory changes which have deprived amateurs of significant amounts of spectrum at 220-222 MHz and at 420-430 MHz."

Teletrac filed a "compromise" proposal to rearrange the allocation in an effort to mollify various users of the band and still accommodate more LMS activity. It would require two wideband LMS systems to share 902-912 MHz, and would permit narrowband LMS in the remainder of the band.

"The comments make reference to protection under this scheme for Government users, Part 18 ISM [Industrial, Scientific & Medical] devices, and for Part 15 devices operating above 912 MHz,"

ARRL observed. "There is no proposal whatsoever for accommodation of ongoing amateur operations at 902-904 MHz, however. Neither does the proposal exempt the 912-918 MHz segment from LMS operation. While the proposal for sharing ten MHz by two wideband systems is indeed a step in the

right direction, the frequency configuration is simply not acceptable to the Amateur Service, and ignores existing users of the band."

ARRL found most objectionable PacTel's proposal to create a segment at 902-902.5 MHz for a narrowband channelized type of LMS operation: "Such a configuration would completely preclude the continued operation of expensive, extremely sensitive amateur weak-signal stations which operate between 902 and 904 MHz.

"This, and the entire channelization proposal contained in the PacTel ex parte comments points up the extent to which existing users of the 902-918 MHz band will be disrupted by the expanded AVM/LMS systems proposed to be permitted to operate in the entirety of the band."

ARRL reminded the FCC that it filed a petition for rule making on January 13, 1994 that requested primary-status amateur allocations at 902-904 and 912-918 MHz. The FCC has not yet formally accepted the petition, which would be indicated by the award of a file number, enabling the public to comment.

GIANT COMMERCIAL SATELLITE NETWORK PLANNED *Amateur operator developed packet network in the sky!*

Microsoft's Bill Gates and McCaw Cellular's Craig McCaw, two of the nation's wealthiest individuals, are the principal investors in a \$9 billion project to orbit hundreds of satellites for high-bandwidth communications. Each will own more than 30% of the project. Separately, Microsoft has invested in a terrestrial radio E-mail network for portable communications devices.

The satellite system was invented by an obscure company known as Calling Communications which announced it last year. It received virtually no attention from the worldwide press until the business was acquired by Gates and McCaw and renamed Teledesic Corp. The company filed its formal (175-page) application on March 21 after re-announcing it to the world, this time generating a flurry of news stories.

The founder of the Teledesic concept and Vice Chairman of the company is Edward F. Tuck of West Covina, Calif. Ed is also a General Class ham with the station call sign: WD6CRP. Headquartered in Kirkland, Washington, Teledesic submitted its proposal as part of the FCC's examination of LEO (low-earth orbit) satellite systems in the 28-GHz band. Craig McCaw has now assumed the duties as chairman of Teledesic.

With its application, Teledesic submitted the FCC's required filing fee - a mere \$216,000! (The application was in great demand when we arrived at the FCC early the next morning to look at it. Several copies had already been stolen!)

The system can only be described as MASSIVE! Teledesic proposes to place into low-Earth orbit a ring of 964 satellites - 880 active "birds" plus 84 spares. This is said to be about three times the number of all satellites in the world today. The peculiar-looking satellites resemble upside-down flowers of eight petals. Each jointed petal consists of three panels; each panel is a complete transceiver with phased-array antenna.

The company described its service as a "Global Internet," offering voice channels, broadband channels supporting videoconferencing and interactive multimedia, and real-time two-way data services. Supported data speeds range from 16 kbps to 1.244 Gbps for "special applications".

If devoted to narrowband voice channels exclusively, the system could support 20 million users. It will in fact be used for a smaller number of channels of higher average bandwidth. Video could be transmitted at "VCR quality." All communication is treated identically within the network as streams of 512-bit packets. Each satellite is a node in this packet network, with links to eight adjacent satellites.

Unlike Iridium, Motorola's proposed \$3.4 billion 2 GHz system of 66 satellites (or its several competitors), Teledesic is supposed to be for fixed, not mobile, use. However, we expect this distinction to prove largely artificial once the system is in operation.

In addition to commercial network applications, the company sees many educational benefits. "The interactive wireless broadband capability of the Teledesic Network holds the promise of delivering distance learning services to the most remote parts of the United States and the world," the company said.

"Students in even the smallest school districts can use advanced information technology for such purposes as to access NASA, to leave messages for astronauts, to browse around libraries larger than they will ever be able to visit, to interact with explorers in Antarctica, and to discuss world ecology with students in countries around the world."

The company expects to begin launching satellites in the year 2000, with regular service beginning in 2001. Teledesic Bands

Uplinks	28.6-29.0 and 27.6-28.4 GHz
Downlinks	18.8-19.2 and 17.8-18.6 GHz
Intersatellite Links	59.5-60.5 and 62.5-63.5 GHz

The complex satellite network will rely primarily on technology (code-named "brilliant pebbles") developed under the government's Strategic Defense Initiative ...the so-called "Star Wars" program. Basically, network communications travel from satellite-to-satellite and are eventually downlinked to land-based destinations for distribution by existing terrestrial telecommunications carriers.

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• The most recent ham licensing figures indicate that renewals are picking up. Some 1,500 amateurs renewed their ham ticket in Jan. 1994, the first month after the beginning of the ten year term ham license back in 1984. Because of the change from a five to a ten year term, no renewals have been necessary by anyone since 1989.

As part of their new amateur service computer system update, the FCC had planned to send out "renewal card" notices beginning in January. Licensees would only have to return the card to the FCC to routinely renew their ham ticket. The program fell behind schedule, however, and the new computer and renewal program has yet to be implemented.

In January we tested a mail-out license expiration notification service notifying amateurs whose licenses were expiring. We asked for \$4.00 to cover the notification and renewal service. We also clearly said in the mailing that the FCC does not charge to renew a ham ticket and that the fee went to offset costs involved in operating the service. Based on the result of two test mailings, we increased the fee to \$5.00. (Many amateurs had handled their own renewals - and an extraordinary number of amateurs were either silent keys or had moved during the past ten years without sending in an address change.) The service has been well received by the amateur community and compliments have been running about 100-to-1 in favor.

In March, the ARRL published a "Warning" in their QST *League Lines* column that "A commercial company is sending notices..." Even though we checked the legality of offering this service with the FCC before the first test mailing, the QST "Warning" has been misinterpreted by some of its readers as meaning inappropriate or worse.

In our last issue, we mentioned that the League's attorney Chris Imlay, N3AKD had authored a petition for the American Red Cross which asked for 220-222 MHz spectrum. ARRL Exec. VP Dave Sumner, K1ZZ contacted us and requested that we clarify the fact that Imlay "...is in private practice and is not an employee of the League; the League is but one of his clients." Dave felt that the "...story leaves the impression that the League is somehow involved in the Red Cross filing" which is not true.

I told Dave that I would clarify that issue and asked him to also issue a clarification on the temporary renewal program. Dave said he ran the warning notice because of "member reaction" so I guess a further clarification will not be forthcoming. He said the program should be dropped - which we plan to do once the FCC has their renewal card program underway. We asked the FCC in Gettysburg when that would be, but they were not sure since they must first get the "bugs" out of other aspects of the system first.

JANUARY 1994 AMATEUR LICENSING STATISTICS

<u>January</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>
New Amateurs:				
New Novices	1713	655	1288	187
New Tech's	89	3318	3381	2179
Total New:	1816	4030	4728	2398
Upgrading:				
Novices	512	921	630	237
Technicians	243	*637	*763	*478
Generals	147	417	389	237
Advanced	92	279	259	186
Total:	994	2254	2041	1138
Renewals:				
Total Renew:	63	62	82	1500
Novices	6	7	11	102
Purged:				
Total Dropped:	2199	8	7	10
Novices	1010	0	2	0
Census:				
Indiv. Oper.	502133	547139	592378	631726
Change/Year	+35579	+45006	+45239	+39348

Individual Operators by Class: (and % of total)

<u>Extra</u>	<u>Advan.</u>	<u>General</u>	<u>Technic.</u>	<u>Novice</u>	<u>Total:</u>
January 1991					
53941	105411	119905	127785	95091	502133
10.7%	21.0%	23.9%	25.5%	18.9%	100.0%
January 1992					
57809	107868	122786	161588	97088	547139
10.6%	19.7%	22.4%	29.5%	17.8%	100.0%
January 1993					
61615	110089	125568	195385	99721	592378
10.4%	18.6%	21.2%	33.0%	16.8%	100.0%
January 1994					
65392	112339	126570	229130	98295	631726
10.4%	17.8%	20.0%	36.3%	15.5%	100.0%
Club/					
RACES &	(1991)	(1992)	(1993)	(1994)	
Military:	2434	2431	2431	2407	
Total Active:	504567	564957	594809	634133	
% Increase	+6.6%	+12.0%	+5.3%	+6.6%	

(* = Does not include Technicians upgrading to Tech Plus)

AMATEURS BY CALL SIGN GROUP:

<u>Group</u>	<u>Extra</u>	<u>Advan.</u>	<u>General</u>	<u>Technic.</u>	<u>Novice</u>	<u>Total</u>
A	36653	666	246	7	0	37572
B	4449	30163	52	6	1	34671
C	15020	44363	67380	96535	43	225341
D	9024	37031	58786	130521	98249	333611
Other	246	116	106	61	2	531
Total	65392	112339	126570	229130	98295	631726

[Group "A"=2X1 & 2X2; "B"=2X2; "C"=1X3 "D"=2X3 format.]

[Source: FCC Licensing Facility, Gettysburg, PA]

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MORE ON THE INTERNET INFORMATION HIGHWAY

As mentioned in our last issue, some 20 million users are now on the granddaddy of all computer networks, the Internet. The net has been doubling in size every five years. And users are being added even faster ...at about 10% a month. Another 5 million users of on-line networks also have access ...at least to the E-mail portion.

What used to be used solely for research and academic purposes now has reached the general population/residential sector. In short, the Internet is now a commercial consumer product. You can obtain a provider list and startup information by calling the InterNIC (Network Information Center) toll-free at 800-444-4345. (6:00 a.m. to 6:00 p.m. EST) or FAX: 619-455-4640. This same organization also registers machines and issues IP (Internet protocol) addresses to net members. Call them and at least listen to their recorded info.

Initially, the U.S. government funded the network through the National Science Foundation and the Department of Defense. The National Science Board (NSB) makes the major decisions at the NSF. NSFNet, formed a decade ago to connect nine supercomputer centers, is managed by a consortium of Michigan universities and indirectly, by IBM and MCI. The NSFNet "backbone" is now being privatized to commercial providers. And the NSB has approved MCI as the operator of another network which will be separate from the Internet. AT&T is developing a Directory of Directories.

Navigating the Internet

Since the Internet is gigantic and is not owned by anyone, it tends to be difficult to negotiate. In short, it is not user-friendly. The two most widely-used browser/search/interface devices are the "Gopher" (developed in 1991 at the University of Minnesota - home of the Golden Gophers) and "Mosaic," a product of the National Supercomputing Center Association. The NSCA is located at the University of Illinois in Champaign. Others browsers are available ...all at no cost online. FTP (file transfer program) is a generic tool for retrieving files and Telenet, a way of logging onto someone else's computer.

Many independent software companies are now developing automated/simplified menu-driven consumer packages that include the transmission control protocol/Internet protocol (TCP/IP) and browsers such as "Mosaic". These "plug-and-play" programs offer good documentation as well as support. (Be on the lookout for the "Internet-in-a-Box" ...about \$100.)

TCP/IP is needed to connect dissimilar PCs to the Internet. It was invented by MCI's Vinton Cerf, co-founder and president of the Internet Society. The

original idea of the Internet was simply a mechanism to lash different computers to each other. Theoretically TCP/IP was to be a stop-gap standard but many insiders now feel an upgraded version could well become the standard of the Information highway. The Internet consists of more than 26,000 different networks. TCP/IP can handle more than a million.

Common carriers are noting the public's appetite for computerized information and are jumping on the Internet bandwagon. Phone companies (such as AT&T, MCI, Sprint) are beginning to offer Internet through national Internet access providers. Not to be outdone, cable companies are testing cable modems that link viewers to the Internet over their coaxial networks. An Internet online magazine ("Global Network Navigator") focuses on features.

E-Mail addresses

If you have an on-line service (such as Prodigy, CompuServe, Delphi, MCI-Mail, America Online, GENie ...and others) you already can send and receive electronic mail over the Internet. E-mail addressing is very simple. You simply indicate the user name/number at (@) the online service and then add three suffix letters. For E-mail, this is usually "com" (which stands for commercial organization.) Other suffixes include: edu (Educational), gov (Government), mil (Military), org (non-profit organization). Note lower case letters.

Sending E-mail to an MCI-Mail user: The Internet address is: user ID name or number @mcimail.com. Thus my Internet address is

fmaia@mcimail.com (or 3511297@mcimail.com). There are no spaces and a period before the com.

With Compuserve it is a little different. Their IDs are two numbers separated by a comma. Since Internet can't recognize commas, change the comma to a period and add @compuserve.com. For example: Want to send E-mail to talk show host Rush Limbaugh? His Compuserve ID is 70277,2502. From any online service his electronic mail address is

70277.2502@compuserve.com

(Period between the two ID numbers and between the online service and the com) Here are some others: Prodigy (IBM/Sears): ID number @prodigy.com (I am GTVT44A@prodigy.com) America Online: User name plus @aol.com AT&T Mail: Username@attmail.com BIX (run by Byte magazine): User ID@bix.com Delphi: Username@delphi.com GENie (operated by General Electric Information Service): UserID-@genie.geis.com (Note the two periods.) SprintMail: Alias@sprint.com

You get the idea. Homework: Send an Internet message to me at my MCI-mailbox telling me if you want this Internet information to continue. Is it useful?

• **DARA (Dayton Amateur Radio Association)** is the recipient of some **unexpected free publicity!** The April Radio Shack (full color) advertising flyer which mails to about 10.5 million homes will carry the Dayton HamVention logo and the dates of the ham gathering. Just about every ham operator in the U.S. gets the Radio Shack circular in the mail. HamVention, which runs from April 29 to May 1, is America's largest ham gathering with some 35,000 amateur radio operators attending every year. (As usual, The W5YI Group will be in booth No. 429.)

• And while on the subject of the Dayton HamVention, our grapevine tells us that **ICOM will be introducing a new ICOM-820 Satellite Base Station Transceiver.** The transceiver will be 9600 baud compatible out of the box, is in the 50 watt output class and covers 146/435 MHz.

• **Cable operators are understandably concerned about the coming billion dollar DBS roll-out!** If everything goes as planned, DirecTV and its partner, United States Satellite Broadcasting, Inc. (USSB) will be beaming full power digital DBS (Direct Broadcast Satellite) service to the public within a month! GM and Hughes Electronics are spending some \$750 million to offer satellite-to-home television via their DBS-1 satellite. And a DBS-2 bird will follow later this year.

Programming will be uplinked by 54 high-power satellite uplink transmitters from DirecTV's \$100 million all-digital Castle Rock (Colorado) Broadcast Center. Supposedly the 24-hour service will eventually have 150-channel capability and some 30 pay-per-view sports channels. DirecTV debuts on May 1st with 75 channels broadcast from one jointly-owned satellite. USSB will be uplinking from their new \$10 million broadcast center in Oakdale, MN.

But satellite television won't come cheap! Viewers wanting the new service will have to shell out \$700 for the 18-inch dish and receiving equipment ...plus an installation charge ...plus a monthly subscription fee which starts at \$21.95 monthly. The equipment can be purchased in installments of about \$30 a month, however.

RCA has an exclusive deal with

DirecTV to manufacture the first one million receiving units. (Actually the Digital Satellite System home receiving unit is being made by Thomson Consumer Electronics under the RCA label.) Thomson will spend nearly \$100 million on an advertising campaign; Hughes another \$50 million. The satellite service will be marketed by such well-known consumer retail outlets as Sears, Wards, Best Buy and Circuit City.

DirecTV says their signal quality will be better than cable since it is digital and they will offer double or triple the amount of programming options.

DirecTV's break-even point is 3 million subscribers - or about 5% of the current cable market. We understand that the DBS service will be first test marketed in 5 cities (Tulsa OK, Albuquerque NM, Little Rock AR, Jackson, MS and Shreveport, LA) before the national roll-out begins later this fall.

And another new DBS service (EchoStar) is on the horizon for 1995.

• President Clinton has indicated his intention to appoint two women lawyers to fill the two FCC Commissioner vacancies. **Rochelle Chong, at 34, will be one of the youngest FCC Commissioners and the first of Asian-American heritage.** She is currently a San Francisco lawyer specializing in communications (cellular phone) law. She also has a degree in political science and journalism. Chong, a Republican, will fill the unexpired portion of Commissioner Sherrie P. Marshall's term which ends in 1997. She was not Clinton's first choice, but one acceptable to Senate Minority Leader Robert Dole (R-Kan.) Dole supposedly held up the confirmation of FCC Chairman Reed Hundt until the White House came up with a Republican nominee to his liking.

We also understand that **Susan Ness, 45 will fill the Democratic seat** made vacant when Ervin Duggan resigned to head the Public Broadcasting System. She has personal ties to Clinton and was an active Clinton-Gore supporter and campaign fund raiser. Ness has a law degree from Boston College and a MBA from the University of Pennsylvania's prestigious Wharton School of Business. She is a member of the Federal Communications Bar Association.

• We understand that the FCC has taken final action on establishing a new **compliance policy for amateur stations participating in automated packet radio message forwarding networks.**

You will remember the 1991 turmoil that resulted when several amateurs were cited by the FCC for unknowingly and automatically retransmitting an anti-Persian Gulf war packet message that had "900" phone number business overtones. It wound its way through several stations before being killed.

Amateurs were afraid they would have to shut down their high speed packet radio messaging system because of their inability to individually review every message flowing through their "digipeating" stations.

To address the dilemma, the FCC proposed in March 1993 to add a new rule § 97.217 which would hold both the message originator and the operator of the first forwarding station retransmitting a packet message accountable for message content. Current Part 97 rules do not distinguish between amateur stations that originate and forward packet messages.

Our deadlines are one week earlier this month due to our attendance at the Dayton HamVention, so we are unable to report exactly how the FCC ruled. We will cover the *Report and Order* in detail in our next issue.

• **Record numbers (more than 70 thousand) attended the 1994 convention of the National Association of Broadcasters** held last month at the Las Vegas Convention Center. "Reinventing Broadcasting" was the theme as broadcasters seek a location on tomorrow's Information Superhighway. "Multimedia" was a key word!

They heard FCC Field Operations Bureau Chief Richard Smith say that their weekly on-air **Emergency Broadcast System tests will be replaced with a silent test.** The new EBS rules will also include new cable-TV emergency alerting criteria.

The FCC's proposal to award TV stations a second channel for HDTV (high definition television) broadcasting, digital compression, flexible spectrum use and interactive television via special IVDS (218-219 Mhz Interactive Video and Data Service) return paths were also popular subjects.

GMDSS to Replace Morse Code at Sea

Shipboard radiotelegraphers to become part of maritime history

The Global Maritime Distress and Safety System - known primarily by the acronym GMDSS - represents the biggest improvement in marine safety since the first maritime regulations were enacted following the sinking of the *Titanic* in 1912.

It is an automated ship-to-shore distress alerting system that relies on satellite and advanced land-based communications. By incorporating these innovative techniques into the safety system and using ship-to-shore communications links, the GMDSS will significantly improve safety of life and property at sea throughout the world.

The current distress and safety plan at sea is primarily a manual, ship-to-ship system that relies on Morse code radiotelegraphy on 500 kHz and voice telephony on 2182 kHz and 156.8 MHz (VHF Channel 16). Its effectiveness depends on the location of the nearest vessel, radio wave propagation conditions, and the technical proficiency of the radio officer.

Under the GMDSS, licensed radio operators on board GMDSS-equipped ships will use modern equipment to send distress alerts over long distances with assurance that they will be received on shore.

The GMDSS represents more than a decade of work by the London-based *International Maritime Organization* (IMO) and the *International Telecommunication Union* (ITU) headquartered in Geneva. Both the IMO and ITU are specialized agencies of the United Nations.

The IMO is the international governing body for the maritime service. Among its duties is the specification of equipment to be carried aboard certain classes of ships. The IMO is made up of representatives from sixty-six nations that account for more than 97 percent of the world's ocean shipping.

Nearly 200 nations strong, the ITU meets regularly to agree on radio operating procedures and on the allocation of radio frequencies. At the 1987 *World Administrative Radio Conference for Mobile Services* (MOB-87), the ITU adopted GMDSS associated revisions to the Radio Regulations.

A year later, world shipping leaders gave the go-ahead for the introduction of new automatic communications that would mean the end of Morse code for ships at sea. The IMO amended the 1974 *SOLAS* (*Safety of Life at Sea*) Convention to implement the Global Maritime Distress and Safety System internationally. They called the decision "...one of the biggest advances in maritime communications since the introduction of radio."

In an October 1990 proceeding, the Federal Communications Commission said they would adopt the international GMDSS provisions for U.S. "compulsory" vessels. A compulsory ship is defined as a large cargo ship of 300 tons gross tonnage and over and all passenger vessels that carry more than twelve passengers regardless of their size. Compulsory ships are required by law to carry certain radio equipment and personnel for safety purposes.

The FCC telecommunications regulations are contained in Title 47 of the Communications Act. Part 13 of Title 47 covers commercial radio operator qualifications, licenses and examinations. The Part 80 Maritime Service rules specify the radio operator, practices and equipment carriage requirements aboard U.S. vessels. These regulations are based on the international and domestic requirements of the 1974 SOLAS Convention and the U.S. Communications Act.

Just what is the GMDSS?

Basically it is a sophisticated ship-to-shore alerting system with ship-to-ship capability. Actually it is made up of several communications systems, some of which have been in operation for many years. The COSPAS-SARSAT satellite system, which has been in operation since 1982, provides distress alerting using a 406 MHz emergency position-indicating radiobeacon (commonly referred to as an EPIRB.) This radio beacon automatically gives the ship's position and must be able to float free if the ship sinks.

COSPAS-SARSAT is a joint international satellite-based search and rescue (SAR) system established in Canada, France, USSR and the United States to locate emergency radiobeacons transmitting on 121.5 and 406 MHz. The U.S. satellites in this system also receive on 243 MHz.

The International Maritime Satellite Organization's (INMARSAT) maritime mobile satellite system has also been in operation since 1982 and forms a major component for distress alerting and communications. In addition to the satellites, new automated terrestrial data systems and existing systems are combined into one overall communications system which together make up the Global Maritime Distress and Safety System.

The GMDSS will provide for new digital selective calling (DSC) services on the high frequency (HF), medium frequency (MF) or very high frequency (VHF) bands depending upon the ship in distress. These new DSC services will be used for ship-to-ship, ship-to-shore, and shore-to-ship automatic alerting, while

existing terrestrial HF, MF and VHF radiotelephony equipment provides distress, urgent and safety related communications.

The GMDSS will enhance search and rescue operations at sea through the use of the new 9 GHz search and rescue transponder (SART). Finally it will create a global network for the dissemination of maritime safety information (MSI) using three systems: NAVTEX, INMARSAT enhanced group calling (EGC), and HF narrow-band direct-printing (NBDP) radiotelegraphy. Manual Morse code is not part of GMDSS at all.

The two most notable features of the system are that it is based on sea areas of operation and that it offers multiple communications options. The first of these features, sea area basing, divides the seas into four-communications areas. See Table No. 1

Table No. 1

OCEAN COMMUNICATION AREAS

Sea Area A1:

is the area within VHF radiotelephone coverage of at least one coast station at which continuous DSC (digital selective calling) is available (approximately 20-30 miles).

Sea Area A2:

is the area within MF radiotelephone coverage of at least one coast station at which continuous DSC is available (approximately 75 to 150 miles), excluding Sea Area A1.

Sea Area A3:

is the area within the coverage of an INMARSAT geostationary satellite in which continuous alerting is available (approximately 70° North to 70° South), excluding Sea Areas A1 and A2.

Sea Area A4:

is the remainder of the seas of the world (essentially the polar regions) and relies primarily on HF communications.

The sea areas are established by individual countries, which equip their shore stations with appropriate VHF, MF, HF or satellite facilities to "cover" particular segments of ocean.

Multiple communications options

The second significant feature of the GMDSS, multiple communications options, ensures that each ship using the GMDSS will have at least two options of distress alerting appropriate to its sea area. This redundancy will minimize the chance that a ship in distress will be unable to communicate because of weather, radio propagation difficulties, equipment failure, or other circumstances. This feature represents

a significant improvement over the current distress system. A comparison of the primary features of the current distress and safety system and the GMDSS is given in Table No. 2.

The basic concept of the GMDSS is that SAR authorities on shore, as well as shipping in the immediate vicinity of the ship in distress, can be rapidly alerted to a distress incident. The shore-based authorities designated as a Rescue Coordination Center (RCC) can then assist in coordinating rescue operations with minimal delay.

In the United States, the Coast Guard is the designated maritime SAR organization and will operate the necessary RCCs. The particular GMDSS equipment used to communicate varies by sea area and may have several alternatives. Table No. 3 is a simplified chart of GMDSS equipment and its primary functions assuming a mid-ocean distress situation.

Table No. 2

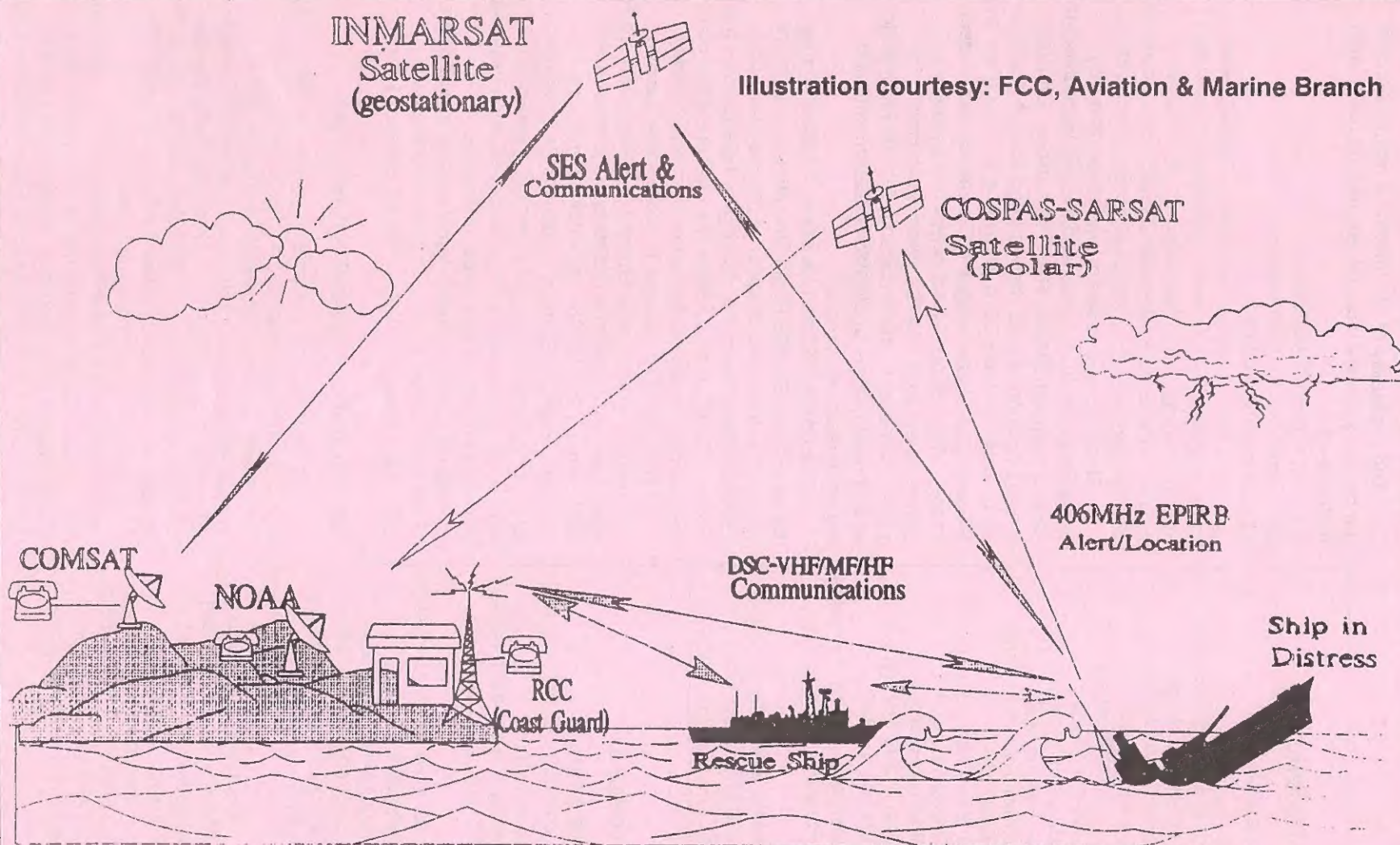
DISTRESS AND SAFETY SYSTEMS AT SEA

Current:	GMDSS:
SYSTEM:	
Ship-to-ship	Ship-to-Shore
EQUIPMENT DETERMINED:	
by ship size	by area of operation
COMMUNICATIONS RANGE:	
Nominal, (150 to 200 miles)	Worldwide using HF or satellites
COMMUNICATIONS QUALITY:	
depends on propagation	improved by satellites and multiple frequency digital data transmissions
WATCH REQUIREMENTS:	
Manual watch	Automatic watch
RADIO OPERATOR:	
Morse code skilled radio officer on ships >1600 tons	Licensed radio operator on all ships
COMMUNICATIONS REQUIREMENTS:	
Different requirements for ships of different sizes	Same requirements for all ships >300 gross-tons and passenger ships

The IMO Conference prescribed two levels of GMDSS operators:

GMDSS Radio Operators

GMDSS ships must carry two GMDSS qualified radio operators for distress and safety radiocommunications purposes. These personnel should be holders of the GMDSS Radio Operator's License. (GMDSS/O). One shall be designated to have primary responsibility for radiocommunications during distress incidents.



An Example of GMDSS Communications

A "float-free" 406 MHz Emergency Position-indicating Radiobeacon (EPIRB) will automatically transmit a distress signal from a sinking ship through the COSPAS-SARSAT geostationary satellite. Direct ship-to-shore communications is also available through the INMARSAT geostationary satellite. New direct ship-to-ship or ship-to-shore communications using HF/MF or VHF digital selective calling (DSC) to the Rescue Coordination Center. In the United States, the designed RCC is the U.S. Coast Guard.

Each ship must carry a second GMDSS radio operator for back-up purposes.

Table No. 3

GMDSS SHIPBOARD RADIO EQUIPMENT

Equipment:	Function:
406 MHz EPIRB	Ship-to-shore alerts via COSPAS-SARSAT satellite
VHF radio (DSC and voice)	SAR Communications (Search and Rescue)
MF radio (DSC and voice)	Ship-to-shore alerts and communications
HF radio - (required for sea area A4)	Ship-to-shore alerts and communications
INMARSAT ship earth station plus EGC capability	Ship-to-shore alerts, communications and MSI (Safety Net)
NAVTEX receiver	MSI (Safety Net) 518 kHz
9 GHz SART	SAR locating beacon
2-way VHF portable radios	SAR communications
2182 kHz watch receiver/auto alarm	Receipt of 2182 kHz alerts until Feb. 1, 1999

EGC=Enhanced group calling, MSI=Marine safety information
SAR=Search and rescue, SART=Search and rescue transponder

All GMDSS equipment must be type-accepted or approved by the FCC. INMARSAT is the primary satellite system used for GMDSS communications.

Table No. 4

GMDSS IMPLEMENTATION SCHEDULE

Date:	Compliance schedule:
Feb. 1, 1992	Voluntary compliance, any ship may be GMDSS-equipped
Aug. 1, 1993	All compulsory ships must have 406 MHz EPIRB and carry a NAVTEX receiver.
Feb. 1, 1995	Newly constructed compulsory ships must be GMDSS-equipped
Feb. 1, 1999	All compulsory ships must be GMDSS equipped. Manual telegraphy, and watchkeeping on 2182 kHz and 156.8 MHz discontinued.

The GMDSS/O license is obtained by passing commercial radio Element 1 (Basic marine radio law) and Element 7 (GMDSS radio operating practices). Element 1 contains 24 questions (pass rate 18 answered correct) and Element 7 contains 76 questions of which 57 must be answered correct.) Holders of the Marine Radio Operator Permit receive examination credit for Element 1. License term is 5 years, renewable.

GMDSS Radio Maintainers

The availability of the functional requirements of the radio equipment must be ensured by using such methods as:

- (1) duplication of equipment,
 - (2) shore-based maintenance, or
 - (3) at-sea maintenance,
- or a combination of these methods. (Two of these three methods are required in sea areas A3 and A4.) For ships using either duplication or shore-based maintenance options, licensed GMDSS radio operators are sufficient for safety communications requirements.

Ships electing at-sea maintenance, and only those choosing at-sea maintenance, will be required to carry a licensed GMDSS Radio Maintainer. Until the Communications Act is changed and license examinations available, the FCC is permitting T-1, T-2 (First and Second Class Radiotelegraph Operators) and holders of the GROL (General Radiotelephone Operator License) to act as a GMDSS Radio Maintainer "...because their examinations currently include knowledge of technical matters applicable to adjustments and repair of radio equipment."

The GMDSS Radio Maintainer (GMDSS/M) may be one of the GMDSS Radio Operators or a different person. Actually any member of the crew may be a GMDSS Radio Maintainer as long as he/she holds the license. The maintainer need not hold any other commercial radio operator license or be a radio officer.

The GMDSS/M license is obtained by passing commercial radio license Element 1 (Basic marine radio law), Element 3 (General radiotelephone electronics) and Element 9 (GMDSS radio maintenance practice and procedures). Element 1 contains 24 questions; Element 3, 76 questions and Element 9 contains 50 questions. (Pass rate is 75% correct on each examination.) License term is 5 years, renewable. Holders of the *Marine Radio Operator Permit* receive examination credit for Element 1; the General Radiotelephone Operator License (GROL): credit for Element 1 and 3.

What about the Commercial Radiotelegraph?

At present, only the question pools for Element 1, 3 and 9 have been released to the public by the FCC. These word-for-word questions - complete with their multiple choices, schematic diagrams and the answer identified - are available from: **National Radio Examiners, Div. W5YI Group, Inc., P.O. Box 565206, Dallas, TX 75356.** VISA/MasterCard call toll free: 1-800-669-9594.

Element 5 and 6 are the question pools needed for the 1st/2nd/3rd Class Radiotelegraph but they have not yet been completed by the FCC. By the way, Extra Class amateur radio operators receive credit for the 2nd Class commercial telegraphy exam without testing.